

Sands from 3 beaches of the Corfou island, namely Arila, Glyfada and Ag. Georgios, were analysed for a number of major, trace elements and main minerals. In particular SiO_2 , Al_2O_3 , Fe_2O_3 , MgO , CaO , Na_2O , K_2O , TiO_2 , P_2O_5 , MnO , Ba , Co , Cr , Cu , Li , Ni , Pb , U , V and Zn were analysed with I.C.P., Corg with LECO carbon analyser, and the main minerals with X-ray diffraction analysis. The highest levels of SiO_2 , Al_2O_3 , Fe_2O_3 , K_2O , TiO_2 , Ba , Cr , Ni , V and Zn are in general found in the sands of Arila and Ag. Georgios beaches while the Glyfada beach sands contain relatively high values of CaO and MgO . Cu , Co , Pb , U and Corg appeared to be uniformly distributed. Quartz, and calcite mainly of terrigenous origin, are the main minerals.

Introduction

The beaches of Arila, Glyfada and Ag. Georgios at the western coast of the Corfou island (Fig.1), consist of well to very well sorted sands and in some cases sands and gravels, materials of second cycle or erosion, which are supplied by streams and coastal erosion (CONISPOLIATIS, 1989). The principal rock types supplying coarse sediments to the beaches are Tertiary sandstones, breccias, conglomerates marls and conglomerate limestones (MARAGOUidakis, 1967, GEOL.MAP OF GREECE, 1962).

The aim of this research is to evaluate the main minerals present in the beach sands, to the levels of SiO_2 , Al_2O_3 , Fe_2O_3 , MgO , CaO , Na_2O , K_2O , TiO_2 , P_2O_5 , Corg, Ba , Co , Cr , Cu , Li , Ni , Pb , U , V , Zn and to delimit areas of anomalous composition.

Materials and Methods

60 sediment samples were collected from beaches of the western coast of the Corfou island, for sedimentological, mineralogical and geochemical analyses. The results of the sedimentological analyses have been given in a previous investigation (CONISPOLIATIS, 1989).

The samples were examined under the binocular microscope and the bulk mineralogy of the powdered samples was studied by X-ray Phillips diffractometer. The main minerals were determined semi-quantitatively according to the method of NORRISH and TAYLOR (1962). The samples were analysed chemically with Inductively Coupled Plasma (ICP) after a total digestion by a $\text{HF-HClO}_4\text{-HCl}$ mixture. Corg was analysed with a LECO carbon analyser.

Results

The most abundant minerals are quartz and calcite. Quartz ranges from 13% to 37% and calcite from 17,8% to 46,2%. Major and trace elements levels, fall in the ranges : SiO_2 , 25.36-66.12%; CaO , 15.36-33.81%; Al_2O_3 , 0.70-2.40%; MgO , 0.58-5.33%; Fe_2O_3 , 0.03-1.59%; Na_2O , 0.27-1.62%; K_2O , 0.22-0.66% ; TiO_2 , 0.03-0.57%; P_2O_5 , 0.12-0.23%; MnO , 0.02-0.11%; Corg, 0.07-1.11%; Ba , 41-514 ppm; Co , 8-27%; Cr , 43-383%; Cu , 43-383 ppm; Cu , 2-23%; Li , 11-26 ppm; Ni , 7-59 ppm; Pb , 2-7 ppm; U , 2-5 ppm; V , 15-39 ppm; Zn , 6-24 ppm.

Discussion and Conclusions

The microscopic examination revealed very low contents of biogenic material (shells and shell fragments) (<4%) and heavy minerals (<3%). Therefore, the abundant calcite seems to be of terrigenous origin. The main minerals of various size fractions were also examined : calcite and dolomite tend to be concentrated in the coarser sand fractions, quartz in the medium sands and feldspars tend to be concentrated in the fine and very fine sand fractions.

The concentrations of CaO and MgO in the Corfou beach sands, in general, are high compared with the average values of CaO and MgO in sandstones and shales given by PETTIJOHN (1957) and AHRENS (1965), respectively.

The highest values of SiO_2 , Al_2O_3 , Fe_2O_3 , K_2O , TiO_2 , Ba , Cr , Ni , V and Zn are found in the sands of Arila and Ag. Georgios beaches while the sands of the Glyfada beach are characterized by relatively high values of CaO and MgO . Cu , Co , Pb , U and Corg appeared to be uniformly distributed, their levels are generally low and did not indicate any significant input. The mineralogical and chemical composition of the beach sands seems directly correlatable to the rock lithologies of the adjacent land. The extremely low levels of Corg could be due to the sandy nature of the sediments. Two samples from the Glyfada beach, being relatively enriched in Corg and Cu , are considered to have been contaminated to some degree with domestic sewage.

Fig.1. The Corfou island and the beaches mentioned in the text
1: Arila, 2: Glyfada, 3: Ag.Georgios



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